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Dephasing of mesoscopic interferences from Electron Fractionalization[1]

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The understanding of dephasing processes (the physical causes of supressed interference effects) constitutes a topics of perpetual interest in mesoscopic systems. Phase-breaking mechanisms in ballistic systems of dimensionality less than two are presently not completely understood and therefore deserve intensive theoretical and experimental endeavors. In this talk, we investigate the dephasing of mesoscopic interferences by electron-electron interactions in a well-defined geometry composed of two tunnel-coupled wires embodied by a Luttinger liquid. We thoroughly demonstrate that interactions can produce a visible attenuation of Aharonov-Bohm oscillations [1]. Moreover, in our geometry, we firmly emphasize that the emerging dephasing time results from the electron factionalization phenomenon that is known to produce an electron life-time in 1/T with T being the temperature [2]. A dephasing time in 1/T has been reported in one-dimensional GaAs rings.

[1] Karyn Le Hur, Phys. Rev. Lett. 95, 076801 (2005).
[2] Karyn Le Hur, Phys. Rev. B 65, 233314 (2002).

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